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(56) Documents Cited

GB 2202199 A

GB1593449 A

GB 0854905 A

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(54) Pilot flight safety advisor and flight/mission controller

(57) A system that can monitor an aircraft by monitoring messages on the aircraft's systems network, can check the state of switching and other devices and can detect potential problems and advise the pilot so he can react accordingly. This is achieved by means of an advisor/controller device that analyses the information monitored and generates an appropriate aural warning message via a speaker in the cockpit. Using the same method, the system can also remind the pilot to carry out tasks. In certain cases, the system can initiate a task itself by generating either a message over the aircraft's system network or controlling a switching device. The advisor/controller device 3, comprises a power socket 4, and may be connected to the aircraft's system network by a socket 5, to a cockpit speaker via a socket 6, and to devices such as switches via a socket 7.

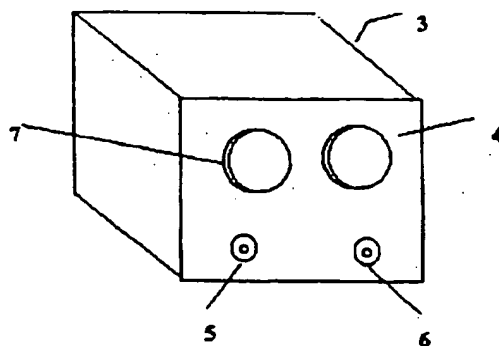
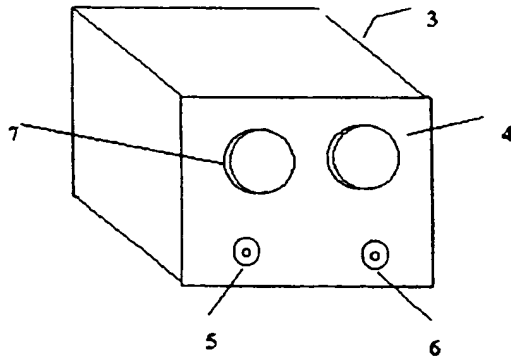


Figure 1

GB 2 314 542 A



**Figure 1**

## PILOT FLIGHT SAFETY ADVISOR AND FLIGHT/MISSION CONTROLLER

This invention relates to a pilot flight safety advisor and flight/mission controller.

All aircraft, commercial and military are very complicated machines consisting of a large number of systems, all duplicated a number of times for reliability's sake. Many of these systems have displays and controls in the cockpit, duplicated yet again. Fundamentally, the pilots' task is to assess the state of and control all these systems to achieve either a safe flight, or successful mission. The pilots workload is immense, but as yet, no method has been found to reduce it, without introducing the possibility of flight safety problems.

Most new aircraft now have a system network which connects all the major components together so that they can communicate with each other. An immense amount of information is available on this network, which gives an accurate picture of the current state of the aircraft. The amount of information could easily be increased so that every major system state is available, i.e. each system's opinion of its current situation, control states, sensor information, etc.

All this information can be monitored by another system. The pilot flight safety advisor and flight/mission controller. The flight safety advisor capability can assess the information, look for potential problems, and advise the pilot accordingly, so that he can take evasive action. The capability can also detect tasks that the pilot has forgotten and remind him, i.e. lower the undercarriage. The flight/mission controller capability, in certain cases, can carry out tasks that the pilot would normally do. This control could be limited to only non-flight safety tasks.

This pilot flight safety advisor and flight/mission controller system would be effectively be above all the other systems, monitoring and occasionally controlling. The other systems would still operate as normal, having the same displays and controls. If the pilot flight safety advisor and flight/mission controller failed, then it has no effect on the aircraft and therefore the flight or mission. The pilots workload would just increase.

According to the present invention there is provided a system that continuously monitors and assesses the current state of an aircraft, advises the pilot of potential problems and that can control selected tasks, therefore reducing pilot workload and improving flight safety.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawing in which:-

Figure 1 shows the pilot flight safety advisor and flight/mission controller, with power and other sockets to the front.

Referring to the drawing the pilot flight safety advisor and flight/mission controller consists of a body 3 which is fed power via the power socket 4 connected to the aircraft's system network by the network socket 5. The system is also connected to a speaker in the aircraft's cockpit via the speaker socket 6 and to simple devices such as switches via the discrete socket 7.

Usually messages on a network are either "addressed", so only a particular system will receive them, or global so all systems receive them. In this example of the pilot flight safety advisor and flight/mission controllers' case, the address check is removed, so that it receives and processes every message.

The messages fed in via the network socket 5 are decoded, stored away. In addition, the state of switches and other simple devices is fed in via the discrete socket 7. Periodically or when a particular piece of information is received the pilot flight safety advisor and flight/mission controller analyses the information it has received. If the pilot flight safety advisor and flight/mission controller 3 analysis of the information dictates that the pilot should be advised or warned, then it generates in a human voice, an appropriate message, and passes that warning/advise, by signal, via the speaker socket 6 to the cockpit speaker.

If the pilot flight safety advisor and flight/mission controller 3 analysis of the information dictates that a task can be carried out then a message is sent to the appropriate system via the network socket 6 or the discrete socket 7.

The pilot flight safety advisor and flight/mission controller sends a message on to the network via the network socket 4 periodically stating that it is present and functioning correctly. If it fails or the network fails then this will be indicated to the pilot.

The pilot flight safety advisor and flight/mission controller periodically sends a pulse, out of human hearing range, via the speaker socket 6 to the cockpit speaker. Feedback is fed back via the speaker socket 6. If the feedback is not received then it is deemed that the pilot flight safety advisor and flight/mission controller has failed. The system shuts off, stopping the present and functioning message.

Example of pilot advise.

If a messages over the network via the network socket 4 indicate that the aircraft has achieved V2 then send a signal via the speaker socket 6

“V2 ACHIEVED”

If a messages over the network via the network socket 4 indicate that the aircraft has achieved V2 for 10 seconds, and that the undercarriage is still down then send a signal via the speaker socket 6 every 10 seconds until a message via the network socket 4 indicates the undercarriage is up.

“UNDERCARRIAGE STILL DOWN”

Example of non-flight safety control.

If a messages over the network via the network socket 4 indicate that the aircraft has achieved its allocated height band, and has levelled out, then turn off the non-smoking and seat belt signs by sending control via the discrete socket 7.

## CLAIMS

1. A system that continuously monitors and assesses the current state of an aircraft, advises the pilot of potential problems and that can control selected tasks, therefore reducing pilot workload and improving flight safety.
2. A pilot flight safety advisor and flight/mission controller substantially as described herein with reference to Figure 1 of the accompanying drawing.

## CLAIMS

1. A pilot flight safety advisor and flight/mission controller in or on aircraft, which continuously monitors the current operational status of said aircraft and advises the pilot, using a computer generated synthetic human voice, of any detectable status which is of interest, comprising of:

means for monitoring the operation status of said aircraft.

processing means for determining whether a detectable operational status of interest has occurred and selecting an appropriate synthetic human voice message.

means for generating a synthetic human voice.

2. A pilot flight safety advisor and flight/mission controller substantially as described herein with reference to Figure 1 of the accompanying drawing.



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 Claims searched: 1 at least

Examiner: C B VOSPER  
 Date of search: 24 September 1996

# **Patents Act 1977** **Search Report under Section 17**

## **Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): B7W(WRA, WRHX)

Int Cl (Ed.6): B64D 45/00,47/00

Other:

## **Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	GB2202199A FERRANTI (whole document, but page 5, line 23 to page 6, line 5, in particular)	1, at least
X	GB1593449 SIMMONDS (whole document)	1
X	GB0854905 SPERRY (whole document, but page 1, lines 12 to 28 in particular)	1
X	GB0496521 SPERRY (whole document, but page 1, lines 17 to 44 in particular)	1
X	W095/09103A1 UNITED (whole document, but page 10, claim 1, in particular)	1
X	EP0119723A2 SPERRY (whole document, but fig.1 in particular, noting pilot advisory instrument 10, and autopilot channels)	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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